

## ATTACHMENT C

### Complementary Policies

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# Complementary Policies

## 1. Introduction

Zero emission vehicles (ZEV) will play an important roll in meeting California's long term air quality and greenhouse gas (GHG) emission reduction goals. The primary goal of the ZEV regulation is to ensure development, deployment, and commercialization of the most advanced and clean vehicle technologies.

However, the ZEV regulation will not likely be successful without additional policy tools that help ensure infrastructure and market demand for the vehicles. This suite of additional policies is called "complementary policies" in this report. To date, the vehicle volumes required by the ZEV regulation have been relatively small. However, as the regulation starts requiring larger volumes (e.g. 10,000s, or pre-commercial scale), robust consumer demand will be necessary.<sup>1</sup> The following are examples of existing complementary policies that will help the ZEV regulation reach its goal:

- The Low Carbon Fuel Standard (LCFS),
- Vehicle operator-use incentives: High-occupancy vehicle (HOV) lane access and free parking,
- Assembly Bill (AB) 118: Vehicle purchase incentives and infrastructure investment,
- Federal vehicle purchase incentives, and
- Federal tax credit for charging station and hydrogen station installations.

Many of these current policies successfully encourage ZEVs while the vehicle volumes remain low. However, as ZEVs move from the current demonstration volumes to the early commercial volumes within the next decade, additional complementary policies will likely be needed.<sup>2</sup> Some of these could include:

- The Low Carbon Fuel Standard (LCFS), with potential changes to incentivize ultra-low carbon fuels through and fueling infrastructure,
- AB 32 Cap and Trade Revenue Allocation,
- Modified Clean Fuels Outlet Regulation with emphasis on fueling infrastructure for vehicle technologies that align with GHG reduction goals (ARB),
- Efforts to address obstacles to home, workplace, and public charging infrastructure,
- Utility infrastructure investments (renewable electricity & potential upgrades to the distribution grid),

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<sup>1</sup> Many of these policies may be needed to support a broader suite of low-carbon vehicles to meet California's 2050 goals.

<sup>2</sup> Necessary in order for California to meet Governor Schwarzenegger's long term goals in Executive Order S-3-05, which is 80% reduction in GHG emission from 1990 levels by the year 2050

- CPUC efforts to facilitate the development of electric vehicle charging infrastructure and review existing electric vehicle tariffs<sup>3</sup>, and
- Feebate Regulations providing longer-term vehicle price incentives.

Table 1 lists a number of existing and potential policies that can encourage ZEV introduction and deployment. In recognizing the importance of these policies, this paper outlines current and future complementary policies, and the role they are playing and can play in aiding future ZEV commercialization.

**Table 1: Policies that can support ZEV commercialization**

|                     |  |
|---------------------|--|
| Vehicle Volumes     | ZEV Regulation<br>Pavley Regulation  |
| Vehicle Market Pull | Purchase Incentives<br>Time-of Day Rates<br>Feebate Regulations                        |
| Fuel Infrastructure | LCFS<br>Clean Fuels Outlet<br>Cap & Trade Revenue<br>Utility infrastructure investment |

## 2. Vehicle Market Pull Policies

To achieve the 2050 80% GHG reduction target successfully, existing public policy tools will need to succeed. Additional policies will likely also be needed, for example “market pull” mechanisms in early markets when advanced vehicle and fuel costs are high. In the long-term, more economy-wide carbon policies could create higher fuel prices, which would act as a permanent “vehicle market pull” for fuel efficient technologies. However, until carbon policy fuel price impacts are large enough, and until advanced vehicle markets achieve high volumes,<sup>4</sup> targeted complementary policies will likely be needed to address early market barriers.

Specifically, policies are needed that encourage and incentivize consumer acceptance and purchasing decisions during the 2015 to 2025 timeframe. These policies could include ZEV infrastructure investments and requirements, and consumer vehicle incentives. Policies such as these will help create demand for advanced vehicles as well as buy down the high initial cost of the technologies.

<sup>3</sup> CPUC 2009a. California Public Utilities Commission (CPUC). Order Instituting Rulemaking to Consider Alternative-Fueled Vehicle Tariffs, Infrastructure and Policies to Support California's Greenhouse Gas Emissions Reductions Goals. August 2009.

<sup>4</sup> Typically considered in the range of 500,000 vehicles

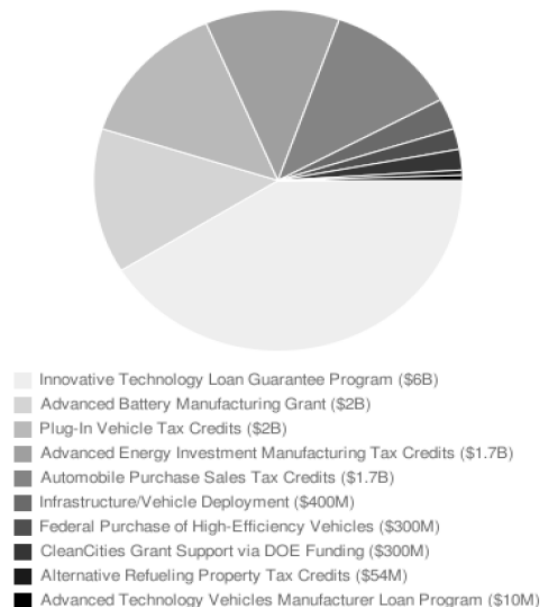
### ***Existing Policies and Programs***

Assemble Bill (AB) 118. Annually, beginning in 2010, ARB will offer monetary incentives for plug-in hybrid electric vehicle (PHEV), electric motorcycle, and ZEV purchases. Purchasers will be able to apply to ARB to receive up to a \$5,000 rebate.

Federal Tax Incentives. Tax credits up to \$7,500 are available for hybrid electric vehicles (HEV), PHEVs, battery electric vehicles (BEV), and fuel cell vehicles (FCV). The total number of vehicles awarded this tax credit is limited: up to the first 60,000 from any one manufacturer or up to the first 250,000 PHEVs. A recent National Academies Study (NAS)<sup>5</sup> recommended vehicle incentives that were durable over a 15-20 year period, but that ultimately phase out as vehicle costs decline. Durable incentives would provide more assurance for industry and private investors that advanced vehicle markets will emerge.

American Recovery and Reinvestment Act (ARRA, Federal stimulus funding, 2009). The ARRA established over \$14.4 billion of investments for PHEVs, BEVs, and electric infrastructure as displayed in Figure 1. For vehicles, this includes manufacturing tax credits, vehicle purchase tax credits, and federal fleet purchases.

**Figure 1: ARRA funding allocation for plug-in vehicles (\$14.4B)<sup>6</sup>**



HOV Lane Access. Some fuel efficient HEVs and compressed natural gas (CNG) vehicles are eligible to receive a yellow sticker, which allows these vehicles to travel in the HOV lane without additional passengers. All

<sup>5</sup> National Research Council, "Transitions to Alternative Transportation Technologies: A Focus on Hydrogen," 2008 (Executive Summary page 17)

<sup>6</sup> PIA. Plug In America. "Stimulus Federal Incentives". [www.pluginamerica.org](http://www.pluginamerica.org). 2009

freeway-capable ZEVs are eligible to receive a white sticker, which allows them to travel in HOV lanes as well. Many manufacturers and members of the public have viewed this as a successful incentive to encourage consumers in high congestion areas to purchase clean and efficient vehicles. All Clean Air Vehicle stickers will expire January 1, 2011 unless the law authorizing their use is extended beyond that date. There is support for new legislation to continue the program that will allow ZEVs to remain eligible for clean air stickers.

California Investor Owned Utilities (IOU) LEV Programs.<sup>7</sup> The California Public Utility Commission (CPUC) authorizes the IOU to have a ratepayer fee that generates funds for the Low Emission Vehicle (LEV) program. LEV program funding in 2009 and 2010 will amount to \$47.9 million and can be used by utilities for the incremental cost to procure plug-in vehicles, as well to fund electric transportation programs.

### ***Possible Future Policies and Programs***

Feebate Regulation. ARB is currently investigating the benefits of applying feebates to new vehicles to complement other vehicle emission reduction strategies. Feebates are a fiscal policy that set a benchmark for greenhouse gases (CO<sub>2</sub>e) for new vehicles. At the time of first purchase, vehicles whose emissions are greater than this benchmark would be assessed a one-time fee and vehicles below this threshold would receive a rebate. The fees collected would be used to pay for the rebates, making the program revenue neutral overall. The amount of the fee or rebate would be based on the difference between a vehicle's emission rate and the benchmark as well as rate schedule. Multiple options exist for designing this type of program.

It would be possible to set a rate schedule that is more favorable towards ZEVs, such that especially low-emitting vehicles receive proportionally greater rebates; or emission reductions from all vehicles could be valued equally, though ZEVs would still receive relatively larger rebates than conventional vehicles. In either case, this type of program could encourage manufacturers to produce vehicles that would be eligible for rebates while also encouraging consumers to purchase them. These rebates could be either in addition to any existing incentives (e.g. federal tax credits) or replacing them (e.g. state incentives). For ZEVs, it would need to decide whether only tailpipe emissions apply to this program or if upstream emissions should also need to be included.<sup>8</sup>

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<sup>7</sup> CPUC 2009b. CPUC. Staff White Paper, "LDV Electrification in California," May 22, 2009

<sup>8</sup> Additional analysis would be necessary to determine the optimal program design in the context of total emission reductions and other policy considerations. The University of California is currently contracted by ARB to research the potential benefits of a feebate program in California; the results are anticipated by January 2010.

### 3. Fuel Infrastructure

Fueling infrastructure for ZEVs includes production and delivery of hydrogen fuel and electricity for passenger vehicles. In order for ZEV sales to successfully expand as mandated under the ZEV Regulation, fueling infrastructure will need to be in place, publicly accessible, and reliable to give future ZEV consumers and manufacturers confidence that their ZEV investment will be worthwhile. This is especially true for hydrogen.

The challenge is that private investment and a viable business opportunity for commercial ZEV infrastructure is lacking for the short term, and varies widely depending on the fuel. For example, a hydrogen station may not become profitable until demand reaches 500-1000 kilograms per day, meaning it could take as long as 10 to 15 years for major energy firms to see a return on their investment. Such investments are particularly risky when there is uncertainty in size and timing of FCV markets.

Infrastructure for electric vehicle charging also faces many challenges. Although early vehicle charging for PHEVs can take advantage of existing residential infrastructure, distribution upgrades and installations of home<sup>9</sup> and workplace charging stations will be needed as vehicle volumes increase. As the numbers of BEVs increase, the demand for home, workplace and eventually public charging infrastructure will also increase.

This section outlines existing and potential future policies that could help address market barriers for ZEV fueling infrastructure. Successful implementation of the ZEV Regulation will depend on progress towards such policies and installed infrastructure.

#### ***Existing Policies and Programs***

AB 118. Along with vehicle incentives from AB 118<sup>10</sup>, annual direct cost-share investments will be made in infrastructure. This will be managed by the California Energy Commission (CEC) and will have annual investment plans to identify funding priorities, followed by a competitive bid process for project awards. Various alternative fuels will be supported, including electric charging, biofuel stations, hydrogen stations, and natural gas stations.

ARRA (Federal stimulus funding). The ARRA established over \$14.4 billion of investments for plug-in vehicles and electric infrastructure. For infrastructure, this includes facility tax credits and up to 50% cost-share for residential infrastructure. See Figure one for a complete cost breakdown of the ARRA funding.

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<sup>9</sup> "Home" charging will be required wherever drivers park overnight, including at multi-family dwellings.

<sup>10</sup> AB 118 funding became available in 2008

U.S. Department of Energy (DOE) Incentive. The U.S. DOE offers a tax credit to fuel providers for the cost of installing alternative fueling equipment. For hydrogen, the maximum credit amount for equipment placed into service before January 1, 2015, is \$200,000.

Federal and State Smart Grid Policies. The Federal Energy Regulatory Commission is implementing the Smart Grid Policy Statement from the 2007 Energy Independence and Security Act, which includes the deployment and integration of plug-in vehicles to the grid. The CPUC has also initiated a proceeding, R.8-12-009, which is a rulemaking to consider smart grid technologies<sup>11</sup>.

Clean Fuels Outlet. The current Clean Fuels Outlet (CFO) regulation<sup>12</sup> was originally adopted in 1991 as a means of assuring that infrastructure was in place for vehicles that operate on alternative fuels such as alcohol fuels and natural gas. The regulation was last updated in 2000.

The current regulation sets the number of designated clean fuel vehicles that would trigger a clean fuel outlet requirement at 20,000, with discount factors assigned to fleet vehicles. The formula for calculating the number of mandated fuel outlets is based on the projected statewide fuel demand divided by clean fuel station throughput volumes set at 300,000 gasoline gallon equivalent (gge)/year for liquid fuels and 400,000 therms/year for gaseous fuels. With these volumes, each new outlet would be required to have enough clean fuel throughput to meet the daily demands of roughly 590 liquid fuel cars or 1,370 FCVs. Electric vehicles are not included in the current regulation. Because of the high threshold trigger, the CFO is not useful in providing fueling infrastructure during the transition from demonstration to commercial volumes.

The regulation places the compliance burden on owner/lessors of retail gasoline outlets. However, over the past 20 years, gasoline station ownership has shifted from the majority being oil company-owned to the majority being owned by small private entities. As indicated in Figure 2, currently two-thirds of the state's 10,900 gasoline stations are owned by entities that own 20 or fewer stations, and only 20 percent of the state's stations are owned by oil companies that own 200 or more stations.<sup>13</sup>

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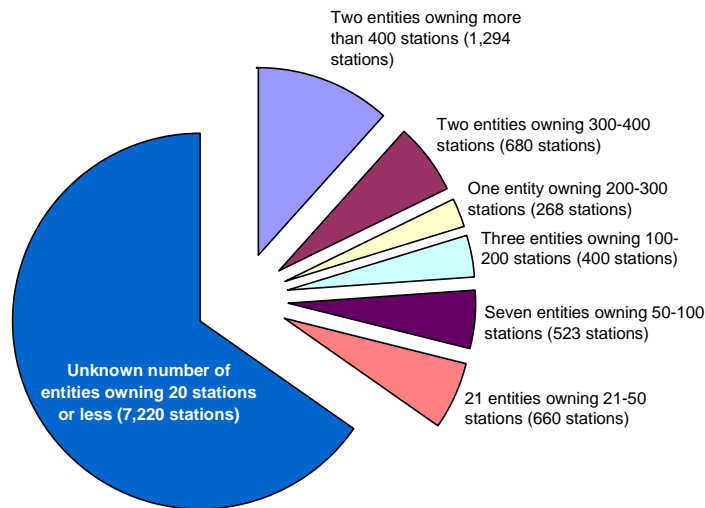
<sup>11</sup> "Order Instituting Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's own Motion to Actively Guide Policy in California's Development of a Smart Grid System." Filed by Public Utilities Commission, December 22, 2008, San Francisco, CA. Rulemaking 08-12-009.

<sup>12</sup> California Code of Regulations Title 13, Chapter 8

<sup>13</sup> SBE 2009 a. Data Source: Bill Benson, Research and Statistics Section, State Board of Equalization (SBE). Database search for entities registered under NAICS 4471 that own 20 gasoline stations or more, September 2009



**Figure 2: Gasoline Station Owner Distribution**



### ***Possible Future Policies and Programs***

CPUC Rulemaking 09-08-009: The CPUC has begun a rulemaking to consider alternative-fueled vehicle tariffs, infrastructure, and policies to support California's GHG emissions reduction goals.<sup>14</sup> The intent of the rulemaking is to develop consistent statewide policies and standards to guide and encourage development of electric vehicle metering, home electric vehicle charging infrastructure, commercial and public charging infrastructure, tariff schedules, and, if advisable, incentive programs. The rulemaking will address:

- The scope and role of CPUC's regulatory authority over BEV and PHEV service providers, including third-party resellers who provide electricity to ZEVs;
- Possible recommendations to ARB regarding aspects of the LCFS which apply to regulating entities which provide electricity fuel; and
- Possible changes to the current rate structure (i.e., separate BEV and PHEV tariff or separate time-of-use meters) to accommodate anticipated increases in electrical usage when customers charge BEVs and PHEVs at home on their residential accounts.

The CPUC invited interested parties to comment on this rulemaking and posed 43 questions for them to consider regarding charging policy (residential, commercial, and public), legal issues related to the ownership and operation of charging stations, codes and standards, electrical system impacts, tariff issues, LCFS, programs and incentives, and scope. As of October 14, 2009, 18 entities representing utilities, energy providers, third party resellers, infrastructure

<sup>14</sup> "Order Instituting Rulemaking to Consider Alternative-Fueled Vehicle Tariffs, Infrastructure and Policies to Support California's Greenhouse Gas Emission Reduction Goals." Filed by Public Utilities Commission, August 20, 2009, San Francisco, CA. Rulemaking 09-08-009.  
[http://www.cpuc.ca.gov/PUC/hottopics/1Energy/090814\\_ev.htm](http://www.cpuc.ca.gov/PUC/hottopics/1Energy/090814_ev.htm)

developers, auto makers, and environmental, renewable energy, and consumer advocacy non-governmental organizations have responded.

LCFS Credit Incentives. In the current LCFS, approved by the Board in April 2009, each type of fuel has a carbon intensity default value based on an assumed pathway of lifecycle emissions from fuel production, transport, and end-use (gCO<sub>2</sub>e/MJ fuel delivered). As such, the carbon intensity values for each fuel vary, but are directly proportional to their lifecycle carbon dioxide equivalent emissions.

ARB is evaluating the concept of incentivizing very low carbon fuels such as electricity and hydrogen. The need for this evaluation is motivated by the fact that these fuels have larger market entry barriers compared to other fuels, and have the long-term potential for truly low carbon transportation fuels. Staff recognizes that this concept deviates from the intent of the current LCFS to evaluate fuels based solely on lifecycle GHG emissions; however, it may have the benefit of encouraging the availability of fuels and fueling infrastructure for a wider suite of alternative fuels that better support the expected advanced vehicle mix. Staff is evaluating a range of options for program changes and assessing potential impacts and means to maintain the benefits of the primary LCFS goals.

Public Financing Program for Hydrogen Infrastructure. Incentive and grant programs are important to helping build new fueling infrastructure. However, the on-going availability of funding is often unpredictable and thus fails to send a consistent signal to those considering investment in hydrogen fueling infrastructure. A comprehensive, durable and sustainable approach to hydrogen infrastructure investment may be needed to give the technology what it needs to advance through the early stages of commercialization. Financing for renewable and low-carbon hydrogen production essential to achieving long term sustainability.<sup>15</sup>

In contrast to hydrogen, development and long-term maintenance of electric vehicle charging infrastructure can conceivably be financed by the electrical utilities that will ultimately pass the costs on to their rate payers. Time of use charging rates will encourage off-peak low carbon charging. Likewise, natural gas infrastructure has received consistent public funding year after year to the extent that commercialization of CNG vehicle technology has not been hindered. Ethanol infrastructure is being incentivized through the LCFS and government funding.

Cap and Trade Revenue. Generally speaking, there are multiple ways of distributing cap and trade program revenue, including to regulated parties such as electric utility companies. In the case where emissions allowances are

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<sup>15</sup> California Health & Safety Code Section 43868 and 43869 (Senate Bill 1505, Statute of 2006) requires that all state-funded transportation hydrogen be low-carbon and 33% renewable, and that all hydrogen produced for transportation be 33% renewable when 3,500 metric tons/year are dispensed.

distributed for free, distribution rules may stipulate how the value of the allowances should be used, including concepts such as investing in renewable electricity or smart grid programs. In the case where allowances are openly sold in a program auction, the State will decide how the revenue will be spent. This could be in the form of a direct rebate to all Californians, or revenue could be allocated as direct funding for low carbon projects.

Clean Fuels Outlet modifications. Staff is currently reviewing the CFO regulation to assess if modifications are needed to ensure adequate supply of low carbon fuels and fueling infrastructure for ZEVs. This review was prompted by the Board's response to the insufficient amount of activity and incentives being dedicated to developing hydrogen fueling infrastructure. Any proposed changes to the regulation would be designed to align near-term (2010-2020) fueling infrastructure growth with long term (2050) low carbon fuel needs. First, dedicated fuels and vehicles included in the regulation would be chosen based on their ability to meet long-term climate change goals, rather than their ability to meet criteria pollutant standards. The number of vehicles needed to initiate the mandate would be reduced and provisions would be added to ensure that fueling outlet locations and station throughput requirements match the needs of existing and future vehicle deployments.

*Vehicle trigger:* Staff will continue seeking auto industry projections on their alternative fueled vehicle production plans per the existing CFO regulation. Additionally, ARB will request specific geographic deployment projections. Auto projections, along with information on current and in-progress alternative-fuel vehicle infrastructure, will be evaluated and considered when developing a new and likely lower, vehicle trigger.

*Pulling the trigger:* ARB would use this data to evaluate the need for new infrastructure for each dedicated fuel vehicle technology. This evaluation would assess whether current needs for these alternative-fueled vehicles are being met by existing infrastructure, including home refueling and workplace or fleet stations that offer fuel to vehicles beyond their fleet. Availability of federal, state and local infrastructure incentives would be assessed, as would the effectiveness these incentives have on spurring infrastructure growth. If the vehicle trigger is reached, the Executive Officer would use this information to decide whether to require fueling infrastructure for this specific fuel (i.e., "pull the trigger").

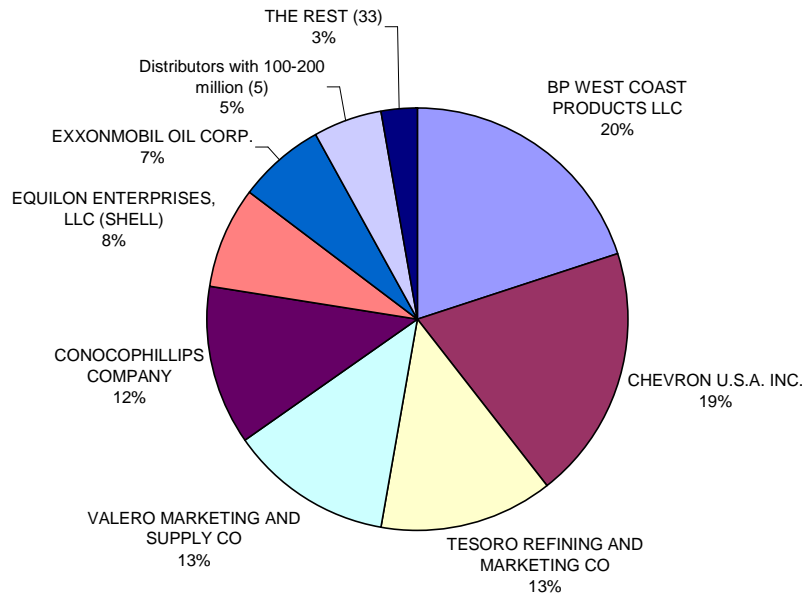
*Regulated party.* Finally, compliance responsibility could be shifted from owner/lessors of retail gasoline outlets to energy companies that supply gasoline to California. The larger of these entities (BP, Chevron, Tesoro, Valero, ConocoPhillips, Shell, and ExxonMobil), as indicated in Figure 3, benefit most from meeting California driver demands.<sup>16</sup> These companies supply the vast

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<sup>16</sup> Data Source: SBE 2009b. SBE Monthly Motor Vehicle Fuel Distribution Reports, July 2008 through June 2009; <http://www.boe.ca.gov/sptaxprog/spftrpts.htm>. In-state production and imports are included in the

majority of California's gasoline regardless of whether they produce it in-state, import it, or manage the retail outlets and should, therefore, have a role in meeting the demands of tomorrow's alternative fueled vehicles.

**Figure 3: Motor Vehicle Fuel Distributors  
Gallons Distributed from July 2008 through June 2009  
Percent of Total – 14,823,800,403 gallons**



#### 4. Conclusions and Recommendations

The ZEV Regulation can be successful if consumers demonstrate demand for advanced vehicles when offered for sale. This will become especially challenging once the regulation requires higher vehicle volumes (more than 10,000). Eventually, long-term vehicle sales will be successful if the automotive industry does not have to rely on market policies such as incentives. However, in the first few years of advanced vehicle sales, consumers will be apprehensive to buy the vehicles because of initially high vehicle costs and infrastructure challenges. Public policies will likely be needed during the period of 2015 to 2025 to encourage early buyers in California. And will likely need to be adjusted or revised every few years as the market for ZEVs develops.

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